

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2005/000020

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: G01M 11/02, A61B 3/12, G01J 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 DWPI & keywords: fundus, retina, ophthalmic; camera, image, photograph, ccd; aberration, distortion, imperfection; compensate, correct, eliminate, remove; phase, wavefront; reference, standard; transform, convert; and other similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X | US 6 331 059 B1 (KUDRAYASHOV ET AL.) 18 December 2001 See column 5 line 33 – column 8 line 17 | 1 – 17 |
| X | PRIMOT ET AL. Deconvolution from wave-front sensing: a new technique for compensating turbulence-degraded images. J. Opt. Soc. Am. A, September 1990, Vol. 7, No. 9, Pages 1598 – 1608. See sections 1 & 2 | 1 – 17 |
| X | WO 1998/027863 A1 (UNIVERSITY OF ROCHESTER) 2 July 1998 See page 6 lines 1 – 29 | 16, 17 |
| X | WO 2002/035995 A2 (JOHNSON & JOHNSON VISION CARE INC.) 10 May 2002 See page 2 line 1 – page 6 line 3 | 16, 17 |

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

* Special categories of cited documents:
 "A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier application or patent but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 "&" document member of the same patent family

Date of the actual completion of the international search
 7 March 2005

Date of mailing of the international search report
 15 MAR 2005

Name and mailing address of the ISA/AU

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| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | WO 2003/105678 A2 (ADVANCED RESEARCH AND TECHNOLOGY INSTITUTE) 24 December 2003 See entire document | |
| A | WO 2003/000153 A2 (ADAPTIVE OPTICS ASSOCIATES, INC.) 3 January 2003 See entire document | |
| A | WO 2000/033250 A2 (YEDA RESEARCH AND DEVELOPMENT CO. LTD) 8 June 2000 See entire document | |
| A | US 6 361 170 B1 (BILLE) 26 March 2002 See entire document | |

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1 – 15 are directed towards an apparatus and method for compensating for aberrations in an optical system in which data relating to measured aberrations are used to correct an image. It is considered that the application of a transformation based on phase data to an image to correct for aberrations in the image comprises a first "special technical feature".
2. Claims 16 & 17 are directed towards an apparatus and method for measuring aberrations in an optical system. It is considered that the measurement of the aberrations in an optical system based on measured phase data comprises a second special technical feature.

The feature common to all of the claims is the measurement of aberrations in an optical system using phase data. However this common feature is well known in the art in the form of Hartmann or Shack-Hartmann wavefront sensors, for example. These sensors measure the shape of a wavefront after it has passed through an optical system, wherein the wavefront is a surface of constant phase. Hence these sensors measure phase data. From the shape of the wavefront compared with a reference shape of an undistorted wavefront, any aberrations in the system are measured. Consequently the common feature does not constitute "a special technical feature" within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over the prior art. Since there exists no other common feature which can be considered as a special technical feature within the meaning of PCT Rule 13.2, second sentence, no technical relationship within the meaning of PCT Rule 13 between the different inventions can be seen. Consequently the claims do not satisfy the requirement of unity of invention a posteriori.

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Box No. II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1 – 15 are directed towards an apparatus and method for compensating for aberrations in an optical system in which data relating to measured aberrations are used to correct an image.
2. Claims 16 & 17 are directed towards an apparatus and method for measuring aberrations in an optical system.

As reasoned on the Supplemental Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU2005/000020

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report | | Patent Family Member | | | |
|---------------------------------------------------------------------------------------------------------------------------|----------|----------------------|------------|----|------------|
| US | 6331059 | US | 6736507 | US | 2002097377 |
| WO | 9827863 | AU | 58062/98 | BR | 9714178 |
| | | CN | 1245406 | EP | 0969760 |
| | | US | 5949521 | US | 6095651 |
| | | US | 2003025874 | CA | 2275762 |
| WO | 0235995 | AU | 95056/01 | US | 5777719 |
| WO | 03105678 | US | | US | 6379005 |
| WO | 03000153 | CA | 2449817 | EP | 1401326 |
| | | US | 6582079 | US | 6595643 |
| | | US | 2003007124 | US | 2003007125 |
| | | US | 2003009156 | US | 2004174495 |
| WO | 0033250 | CA | 2353543 | EP | 1135746 |
| US | 6361170 | EP | 1232722 | US | 6658142 |
| | | JP | 2002282211 | | |
| Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. | | | | | |
| END OF ANNEX | | | | | |